

A stakeholder project to model water temperature under future climate scenarios in the Satus and Toppenish watersheds of the Yakima River Basin in Washington, USA

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Received: 22 June 2012 / Accepted: 11 November 2012 / Published online: 6 December 2012
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Abstract The goal of this study was to support an assessment of the potential effects of climate change on select natural, social, and economic resources in the Yakima River Basin. A workshop with local stakeholders highlighted the usefulness of projecting climate change impacts on anadromous steelhead (*Oncorhynchus mykiss*), a fish species of importance to local tribes, fisherman, and conservationists. Stream temperature is an important environmental variable for the freshwater stages of steelhead. For this study, we developed water temperature models for the Satus and Toppenish watersheds, two of the key stronghold areas for steelhead in the Yakima River Basin. We constructed the models with the Stream Network Temperature Model (SNTMP), a mechanistic approach to simulate water temperature in a stream network. The models were calibrated over the April 15, 2008 to September 30, 2008 period and validated over the April 15, 2009 to September 30, 2009 period using historic measurements of stream temperature and discharge provided by the Yakama Nation Fisheries Resource Management Program. Once validated, the models were run to simulate conditions during the spring and summer seasons over a baseline period (1981–2005) and two future climate scenarios with increased air temperature of 1 °C and 2 °C. The models simulated daily mean and maximum water temperatures at sites throughout the two watersheds under the baseline and future climate scenarios.

This article is part of a Special Issue on “Stakeholder Input to Climate Change Research in the Yakima River Basin, WA” edited by Alec Maule and Stephen Waste.

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